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KILPATRICK, BRYAN T	
ART UNIT	PAPER NUMBER
1797	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No.	Applicant(s)	
	10/528,554	SINDI, HAYAT	
	Examiner	Art Unit	
	BRYAN T. KILPATRICK	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-97* is/are pending in the application.

4a) Of the above claim(s) *2-57* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 58-97* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-14, and 23-40 and 55, drawn to an apparatus having a detecting means.

Group II, claim(s) 15-22 and 41-54, drawn to a sensor having probes.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

> The special technical feature of Group I is a detecting means, and cannot be a special technical feature under PCT Rule 13.2. The use of a detector is known in the prior art, U.S. Patent 5,907,408 (NAYA et al.). NAYA et al. discloses a photodetector in the Abstract.

Applicant's **election** without traverse of **Group I, claims 1-14, 23-40, and 55** in the reply filed on 23 December 2008 is acknowledged. Group II, claims 15-22 and 41-54 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without traverse** in the reply filed on 23 December 2008.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 79, 81-82, and 88 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 79 and 81-82, the word "means" is preceded by the word(s) "the transducer comprises" in an attempt to use a "means" clause to recite a claim element as a means for performing a specified function. However, since no function is specified by the word(s) preceding "means," it is impossible to determine the equivalents of the element, as required by 35 U.S.C. 112, sixth paragraph. See *Ex parte Klumb*, 159 USPQ 694 (Bd. App. 1967).

Regarding claim 88, the word "means" is preceded by the word(s) "the transducer include" in an attempt to use a "means" clause to recite a claim element as a means for performing a specified function. However, since no function is specified by the word(s) preceding "means," it is impossible to determine the equivalents of the element, as required by 35 U.S.C. 112, sixth paragraph. See *Ex parte Klumb*, 159 USPQ 694 (Bd. App. 1967).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by W.O. 99/30135 (BAHATT et al.).

Claim 1 recites an apparatus for detecting a variation in a probe comprising a sensor having a substrate and thin film probe structures, an electromagnetic radiation source, a means of directing radiation, and a transducer. BAHATT et al. discloses an optical resonance system having a sensor means and illumination means in the Abstract. The illuminations device has a lens system for projecting illumination (Abstract) and a light source (page 15, paragraph 2). A substrate having sites for sensing generated resonances is disclosed in page 13, paragraph 7. A sensor means in the form of a transducer having sensor sites for binding unique molecules is disclosed in page 40, paragraph 4 to page 41, paragraph 1; these sensing sites are the same as the probe structures recited in instant claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 58-90 and 92-97 are rejected under 35 U.S.C. 103(a) as being unpatentable over W.O. 99/30135 (BAHATT et al.) as applied to instant claim 1, and in further view of U.S. Patent 6,159,681 (ZEBALA).

Claim 58 recites the sensor is the in the form of a plate. BAHATT et al. teaches the use of a planar waveguide sensor in the last paragraph of page 8 to paragraph 2 of page 10. BAHATT et al. does not explicitly disclose the use of a sensor in the form of a plate. However, ZEBALA teaches a plate as type of substrate (column 17, line 49) that is used to immobilize biologic material for analysis (Abstract). BAHATT et al. and ZEBALA are from the same field of endeavor of using light for analysis. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the plate of ZEBALA with the analysis system of BAHATT et al. since any conceivable substrate that has a convenient shape may be used in light analysis systems and methods (column 17, lines 41-45 of BAHATT et al.).

Instant claim 59 recites the substrate is electromagnetically transparent. ZEBALA discloses an optically transparent substrate in column 18, lines 3-4 and Figure 3.

Instant claim 60 recites the substrate acts as, or is part of, the transducer. BAHATT et al. teaches the use of a transducer with binding sites in paragraph 3 of page 40, but does not explicitly disclose the use of a substrate. ZEBALA teaches that a substrate is a solid surface on which a biological material is immobilized in lines 17-18 of column 17. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the surface of a transducer with binding sites to be a substrate for immobilizing/binding materials onto itself.

Instant claim 61 recites the substrate is of such a thickness that the substrate has sufficient strength for ease of handling, but will permit a desired amount of electromagnetic radiation to pass through the substrate. Instant claim 62 recites the substrate is between 0.2 mm and 1.0 mm thick. Figure 3 of ZEBALA discloses a transparent substrate. ZEBALA teaches that the substrate may be essentially any type of rigid material, shape, or size in column 17, line 17 to column 18, line 6. In addition, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a substrate of 0.2 mm to 1.0 mm thick since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960); MPEP 2144.07.

Instant claim 63 recites the sensor comprises a plurality of probe structures and a transducer for transmitting the electrical response. BAHATT et al. disclose the use of sensors made of transducers and active sites in paragraph 3 of page 1 to paragraph 1 of page 2.

Instant claim 64 recites that different probe materials are bound to different probe structures. Instant claim 65 recites that each probe structure has a substrate surface onto which is bound probe material. ZEBALA discloses the use of attaching linker molecules for attaching biological materials to a substrate surface in column 18, line 8 to column 20, line 38.

Instant claim 66 recites the substrate comprises a thin film. ZEBALA discloses a film as a substrate in column 17, line 48.

Instant claim 67 recites the plurality of thin film probe structures are formed in an array. ZEBALA discloses the use of arrays with linkers in column 19, line 55-67. BAHATT et al. discloses the use of array for analysis in paragraph 4 of page 40.

Instant claim 68 recites probe structures comprise different probe materials. Instant claim 69 recites the probe material comprises molecules of one type. Instant claim 70 recites the probe material comprises a mixture of different molecules. ZEBALA discloses the use of similar and different types of linker compounds for binding/immobilizing materials to a substrate surface in column 18, line 8 to column 20, line 38.

Instant claim 71 recites a surface of the substrate is planar. Instant claim 72 recites a surface of the substrate is curved. ZEBALA discloses that a substrate can be flat or have several circular forms in column 17, lines 41-52.

Instant claim 73 recites the source of electromagnetic radiation emits radiation in the optical portion of the electromagnetic spectrum. BAHATT et al. discloses in paragraph 4 of page 9 the use white light sources, which is the same as the visible spectrum. ZEBALA discloses the use of visible light in column 3, line 63.

Instant claim 74 recites the source of electromagnetic radiation comprises a laser. BAHATT et al. discloses the use of a laser in paragraph 2 of page 15.

Instant claim 75 recites the source of electromagnetic radiation is positioned so that the radiation impinges directly on the probe material. BAHATT et al. discloses the use of an optical analyzing system to analyze samples the last paragraph of page 14 to paragraph 1 of page 15.

Instant claim 76 recites the source of electromagnetic radiation is positioned so that electromagnetic radiation first passes through a substrate transparent to the electromagnetic radiation before impinging on the probe material. ZEBALA discloses an optically transparent substrate in column 18, lines 3-4 and Figure 3.

Instant claim 77 recites the source of electromagnetic radiation emits temporally varying electromagnetic radiation in the optical spectrum. BAHATT et al. discloses in paragraph 4 of page 9 the use white light sources, which is the same as the visible spectrum. In addition, BAHATT et al. discloses that the light source can vary depending on wavelength region needed in paragraph 2 of page 15.

Instant claim 78 recites the substrate is formed from an optically transparent medium, and the source of electromagnetic radiation is adapted to direct the electromagnetic radiation to a lower surface of a probe structure via the substrate. ZEBALA discloses an optically transparent substrate in column 18, lines 3-4 and Figure 3 discloses light coming through the substrate to interact with the bottom of a material bound to the top of the substrate.

Instant claim 79 recites the probe structures are each adapted to absorb electromagnetic radiation to thereby generate a thermoelastic response in the form of a volume change within a probe structure, and in which the transducer comprises means for detecting the volume change. BAHATT et al. discloses the use of transducers with active sites for binding molecules, which in turn increases volume by combining the molecule with the binding species, in an optical analysis system in paragraph 4 of page 40 to paragraph 1 of page 41.

Instant claim 80 recites a probe structure comprises a thin film metal spot. As defined by the instant Specification on page 5, a spot or dot is a location on a substrate surface where thermal activity is assessed. ZEBALA discloses in lines 41-67 of column 17 of different types of substrates such as a film made of different materials and having surfaces made of different materials such as metals. BAHATT et al. discloses the use of metals and dielectric materials for analysis in paragraph 1 of page 40.

Instant claim 81 recites the transducer comprises means for receiving reflected electromagnetic energy from a selected probe structure. BAHATT et al. discloses the use of transducers with active sites for binding molecules in an optical analysis system

in paragraph 4 of page 40 to paragraph 1 of page 41; and the Abstract discloses an illumination system and lens system for directing light onto a sensor such as a transducer.

Instant claim 82 recites the probe structures are each adapted to absorb electromagnetic radiation to thereby generate a thermoelastic response in the form of a lateral displacement of a corresponding probe structure, and in which the transducer comprises means for detecting the lateral displacement. BAHATT et al. discloses the use of transducers with active sites for binding molecules, which in turn increases size by combining the molecule with the binding species, in an optical analysis system in paragraph 4 of page 40 to paragraph 1 of page 41.

Instant claim 83 recites the probe structures each comprise a thin film dielectric material spot. ZEBALA discloses in lines 41-67 of column 17 of different types of substrates such as a film made of different materials and having surfaces made of different materials such as non-metals. BAHATT et al. discloses the use of metals and dielectric materials for analysis in paragraph 1 of page 40.

Instant claim 84 recites the probe structures comprise a transducer element for generating an electrical output signal representative of a thermoelastic response of said probe structures. BAHATT et al. discloses the use of transducers with active sites for binding molecules in an optical analysis system in paragraph 4 of page 40 to paragraph 1 of page 41.

Instant claim 85 recites the source of electromagnetic radiation comprises a laser adapted to irradiate selected ones of the probe structures with pulsed or continuous

wave electromagnetic radiation. BAHATT et al. discloses the use of a laser (fixed, tunable, and other types) in paragraph 2 of page 15.

Instant claim 86 recites the transducer comprises an optical interferometer for receiving a reference beam from an optical source, and an interference beam reflected from a probe structure. BAHATT et al. discloses the use of transducers with active sites for binding molecules in an optical analysis system in paragraph 4 of page 40 to paragraph 1 of page 41. In addition, BAHATT et al. discloses the use of an interferometer in an optical analysis system in paragraph 3 of page 30.

Instant claim 87 recites the transducer includes a transient recorder or digitizing oscilloscope for determining an amplitude and phase variation in thermoelastic response signals received from the probe structures. BAHATT et al. discloses the use of several detecting devices for an optical analysis system in paragraph 3 of page 24 to paragraph 1 to page 25.

Instant claim 88 recites the source of electromagnetic radiation and the transducer includes means for detecting a change in resonant frequency of a selected probe structure. BAHATT et al. discloses an analysis system having a light source, sensor, and detector where the incident light source is on resonance for a particular sample that is imaged at sample active site in paragraph 2 of page 25. In addition, BAHATT et al. discloses the use of transducers with active sites for binding molecules in an optical analysis system in paragraph 4 of page 40 to paragraph 1 of page 41.

Instant claim 89 recites probe structures includes an entrant electrode adapted to provide a ground plane to a lower surface of the substrate. ZEBALA disclose the use of

linkers to immobilize biologic material to a substrate that is also coated and uncoated with a photoresist film (column 4, lines 23-45). ZEBALA also discloses that a photoresist film can be a substrate in column 17, line 56

Instant claim 90 recites a molecular probe material bound to an exposed surface of a probe structure. ZEBALA discloses in column 11, lines 43-45 of ligands that can bind to a substrate or other molecules; and in column 18, lines 8-10 of linkers for binding materials to a substrate surface.

Instant claim 91 recites the substrate comprises a disc, and further comprising: drive means for rotating the disc relative to an axis; indexing means for varying a position of said electromagnetic excitation means and said detection means relative to said axis. ZEBALA discloses a disc as a substrate shape for binding biological materials in column 17, line 45. BAHATT et al. discloses an optical resonance system having a circular sensor and illumination means in Figure 1. BAHATT et al. also discloses a means for providing independent axial and rotational positioning of light sources in paragraph 5 of page 13. BAHATT et al. also discloses that the detector has to be in a position relative to a sensor so that a sensor image is detected.

Instant claim 92 recites the substrate comprises silica. ZEBALA discloses in line 66 of column 17 of the use of silica as a surface material for a substrate.

Instant claim 93 recites the probe structures each comprise a thin film metal spot. ZEBALA discloses in lines 41-67 of column 17 of different types of substrates such as a film made of different materials and having surfaces made of different materials such as

metals. BAHATT et al. discloses the use of metals and dielectric materials for analysis in paragraph 1 of page 40.

Instant claim 94 recites the probe structures each comprise a thin film dielectric spot. ZEBALA discloses in lines 41-67 of column 17 of different types of substrates such as a film made of different materials and having surfaces made of different materials such as non-metals. BAHATT et al. discloses the use of metals and dielectric materials for analysis in paragraph 1 of page 40.

Instant claim 95 recites a transducer element for generating an electrical output signal representative of the thermoelastic response of said probe structure. BAHATT et al. discloses the use of transducers with active sites for binding molecules in an optical analysis system in paragraph 4 of page 40 to paragraph 1 of page 41.

Instant claim 96 recites the probe structures are arranged in a series of generally circular or helical arrays on a circular disc substrate. ZEBALA discloses the use of arrays with linkers in column 19, line 55-67. BAHATT et al. discloses the use of array for analysis in paragraph 4 of page 40. It would have been obvious as a matter of design choice to arrange circular or helical arrays on any surface, since it appears that the invention would perform equally well with arrays arranged differently than circular or helical on any surface.

Instant claim 97 recites a method of using an apparatus, the apparatus comprises: a sensor comprising a substrate and a plurality of thin film probe structures; a source of electromagnetic radiation; means for directing the electromagnetic radiation at each probe structure of the sensor; and a transducer adapted to determine a

thermoelastic response of each probe structure; and wherein the method comprises: providing a plurality of probe materials respectively attached to the plurality of thin film probe structures; exposing the thin film probe structures to a sample material to permit binding of material to surfaces of the thin film probe structures; using the source of electromagnetic radiation to direct electromagnetic energy at the thin film probe structures; and detecting changes in thermoelastic response of each thin film probe structure to the electromagnetic energy by comparing a thermoelastic response with and without exposure to the sample material. BAHATT et al. discloses an optical resonance system having a sensor means and illumination means in the Abstract. The illuminations device has a lens system for projecting illumination (Abstract) and a light source (page 15, paragraph 2). A substrate having sites for sensing generated resonances is disclosed in page 13, paragraph 7. A sensor means in the form of a transducer having sensor sites for binding unique molecules is disclosed in page 40, paragraph 4 to page 41, paragraph 1; these sensing sites are the same as the probe structures recited in the instant claim. ZEBALA discloses a method of analysis where biological material on a substrate is irradiated for analysis using at least two source of electromagnetic radiation, an optics system for the at least two radiation sources, and a detector (column 42, lines 35-63).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,600,563 (BAHATT et al.) discloses an optical

resonance analysis system having a sensor means and illumination means in the Abstract. U.S. Patent Application Publication 2003/0090663 (AUTREY et al.) discloses an analysis system in paragraph [0028] having a light source and a transducer detector.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYAN T. KILPATRICK whose telephone number is (571)270-5553. The examiner can normally be reached on Monday - Friday, 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Samuel P Siefke/
Primary Examiner, Art Unit 1797

BK
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